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ABSTRACT

This article describes an extensive literature review on metacognition which examined the problems and promise that metacognition presents to educators (e.g., why metacognition has not overcome school administrative barriers and why there has been no widespread utilization of learning techniques that have been proven successful). The article defines metacognition, discussing several examples of successful models for teaching metacognition (process-oriented instruction, information-processing model, reflective-research model, and process-based instruction model). It also explains the two major methods of teaching and training metacognition techniques (stand-alone and infused into content). The literature review identified a major gap in the techniques used to teach metacognitive skills. The article suggests an alternative theory to support training in metacognition for high school students. This theory is called the composite theory of intellectual development (CTID). CTID is a paradigm that could effectively attend to the flaws or shortcomings of either the stand-alone or infusion model. CTID holds that stand-alone metacognitive training should be used only in the primary grades. Infusion methods should be reserved for middle and high school as a way of enhancing higher order thinking skills. (Contains 38 references.) (SM)

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Metacognition:
A new implementation model for learning

by

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Abstract

This article reports the results of an extensive literature review of metacognition literature. This review resulted in the identification of a major gap in the techniques used to teach metacognitive skills. After identifying this gap, the authors suggest an alternative theory to support training in metacognition for high school students. This suggested new theory is called the Composite Theory of Intellectual Development (CTID). CTID holds that "stand alone" metacognitive training should be used only in the primary grades. "Infusion" methods should be reserved for middle and high school as a way of enhancing higher order thinking skills.

Metacognition:
A new implementation model for learning

Introduction

The literature is replete with discussions of why 'Johnnie' is not learning. The 1980s were a decade of studies, reports and reform efforts (Caine & Caine, 1994, 1997a, b; Goodlad, 1984, 1990, 1994) pointing out in explicit detail the problems with teacher education programs, teaching and learning in a place called school. It appears that while these reform efforts were well intended, not many could report much success in having resulted in a long term benefit when relating the dollars spent to results obtained. While there were many varied factors influencing the success or failure of school reform programs, one perspective of school failure to achieve stated reform goals were those having too much focus on changing the institution without a concurrent, or superordinate, effort to change the mind set of the organizational members (i.e., teachers, administrators, students, and parents) (Goodlad,1994; Caine & Caine, 1994).

Metacognition is divided into two broad areas, the knowledge about cognition and the regulation of cognition (Everson, 1997). This essay focus's on the problems and promise metacognition presents to educators. Specifically, why has metacognition not overcome school administrative barriers? Why has there been no widespread utilization of learning techniques that have been proven to work? This paper also presents a new theory of metacognition training. Researchers have reported differences in metacognitive abilities between successful and less successful learners. Students with successful

academic records tend to possess more metacognitive skills than their less successful counterparts (Everson, 1997).

Metacognition definition

Interest in metacognition has been ongoing for over 20 years and still there is a lack of clarity as to the meaning of the word. Metacognition is defined as "thinking about thinking" and has a focus on the individual. It has been defined as the ability to monitor, evaluate, and make plans for one's learning. Metacognition refers to the awareness individuals have of their own thinking and their ability to evaluate and regulate that thinking. (Wilson, 1997, p. 4). Metacognition also refers to the planning, self-regulating, and monitoring of one's own cognitive performance. These behaviors are both affective and cognitive in nature. Cognitive issues include understandings about oneself as a learner and the processes of learning. The affective components deal with one's emotions, feelings, and beliefs involved in the learning process (Schunk, 1996, 1988). Metacognition is directly linked to learning style and study strategies.

Metacognition is a skill where the learner manages his/her own thinking behavior. These notions of metacognition are reminiscent of Skinner's *self-management behaviors* and Miller, Galanter, and Pribram's *plans*, Neisser's *executive routines*, and Atkinson and Shiffrin's *control processes* that organize and control the operations of what may be thought of as basic on-line learning and memory processes (Meichenbaum, 1985, p.413).

It is important in the maturation process of the young adult (senior high school/college) student to skillfully use metacognition in learning (Davies, 1983; El-Hindi, 1996; Redding, 1990). It is important in this developing process for the student to

be willing to seek help from teachers and peers as he/she strives to be successful in school and in life's work. The authors believe that there is a relationship between seeking help and needing help. Some research shows that the relationship is inverse; those that need help the most seek it the least (Karabenick & Knapp, 1991, 1988; Knapp & Karabenick, 1988).

Definition is the critical issue for the individual learner to become aware of how he/she learns. The student must appreciate that the ability to control the processes of learning is pivotal to individual school success. Successful students have full control of their learning and use it as a purposive and planned activity (Rowe, 1988; Puntambekar, 1995; Puntambekar & du Boulay, 1997).

Schools, communities, and the society at large have an obligation to act pro-actively in the intellectual development of our young (Abbott, 1997). The process of learning identified by neuroscience and cognitive psychologists is spectacular and messy. Authentic learning does not easily fit within narrowly defined classroom curricula dominated by unrelated content and taught using obsolete pedagogical methods (1997). Understanding "learning" is the key issue of our time.

Various models of teaching metacognition processes have been successfully implemented. One of the larger problems with the teaching of metacognition techniques is the "either, or" approach to implementation. Outlined below are a few examples of successful models for teaching metacognition. The first two models are used primarily in a stand-alone context, i.e., Process-Oriented Instruction, and Information Processing Model. The latter two models are used in an infused context.

Process-Oriented Instruction (POI). The process-oriented instruction is defined as

> instruction aimed at teaching thinking strategies and domain-specific knowledge in a coherence construct. It is an instructional model in which learners are taught thinking strategies to help them construct, modify and use their mental models of the subject domains. . . .because it is focused on learners' processes of knowledge construction and utilization. The thinking activities that students use to learn are the focus of attention. . . . (Vermunt, 1995, p. 326)

Information Processing Model (IPM). This model focuses on the proposition that individual differences in the way information is encoded and retained from the world is greatly impacted by learning styles. Learning styles are defined "as people's consistent way of responding to and using stimuli in the context of learning " (Moran, 1991, p. 239). The learning style has been defined as information-processing habits that represent the learner's usual mode of perceiving, thinking, remembering and problem solving. It involves cognitive, affective, and physiological traits. The concept of learning style is used interchangeably with cognition.

The Reflective Research Model is grounded in prior research on metacognition and learning influences from environmental factors. RRM tries to create interactive learning environments based on three research programs dealing with reading, writing, and mathematics from studies by Bereiter and Scardamalia (1985). Its premise was to "shift away from standard teaching methods of direct transmission to methods that actively engage students in their learning, from rote memory of facts to thinking openly via questioning and reflection of ideas" (Asquith, 1996, p. 9).

Process-Based Instruction (PBI) Model. This model evolved addressing specific learning criteria: 1) Training was to take place in authentic classrooms not in laboratories; 2) it was integrated into the mainstream teaching; 3) application was to current curriculum content rather than on isolated artificial situations; 4) it made students take responsibility for their learning by having students create their own personal learning plans; and, 5) students were encouraged to apply the model elements to different tasks as the way to generalize the learning (Conway & Ashman, 1989).

The two major methods of teaching and training metacognition techniques are delivered in one or the other contexts. Either the techniques are stand-alone or infused. Herein is an analysis of the two methods.

Stand-alone

Stand-alone is the developmental stage of metacognitive training. (Smith & Stovall, 1983). A successful stand alone study strategy program would include at a minimum;

1. personal development, i.e., goal clarification and time management,
2. process skills, i.e., note taking, underlining, reciprocal teaching, and
3. expression skills, i.e., writing, journal writing, test-taking skills.

There are many pre-packaged programs available, but buyer beware, usually these prepackage programs have no connection with local curriculum. One would have to cannibalize such a program for it's exercises and tips. This approach is strongly pedagogical. The exercises tend to be artificial and sometime make the transference of these skills difficult for the student.

School-wide study skills model another stand-alone method would contain at a minimum;

1. Organizing/time management skills,
2. Notetaking skills,
3. Memory skills,
4. Test-taking skills,
5. Reading in content area (as a specific assignment),
6. Vocabulary development, and
7. Listening skills. (Smith & Smith, 1989, p. 5)

The school-wide approach reflects the height of stand-alone programming. These exercises while being useful in training adolescents, are not very useful in teaching adults study strategies because of their lack of authentic experiences outside of the classroom.

Infused into content

Vygothsky's (In Camperell, 1981) theory postulates that social development is a primary apsect of intellectual development. This is a departure from the mainstream of those who accept cognitive development as the central learning approach (Piaget). Vygothsky's Theory can be explained as a content-approach to metacognition in that;

1. social interaction and instruction act as a central of acquisition of knowledge,
2. children's variation of intellectual development (learning skills) varies as a function of the type of education they receive and the level of literacy the acquire,
3. inner-speech (Metacognition) is important,
4. social, or external level between individuals &, and

5. personal, internal level within the individual (Camperell, 1981, p. 6)

Vygothsky's emphasis on the social origins of human development makes his theory of cognitive development distinct from the theories of most psychologists.

Use of a content-based study skills program fully integrated into the curriculum is a better way to teach metacognition skills. Such a program approach would at least consider the following:

1. Thinking skills and related dispositions be reflected in all of the content courses of the local curriculum,
2. Allocation of time to be turned over to metacognition,
3. Modification of current classroom strategies,
4. Learning new concepts and skills at the critical thinking level,
5. Development and modification of current curriculum to allow for metacognitive training, and
6. Allow for tensions between thinking lessons and other instruction (Weinstein, 1988, pp. 17-19).

This infused metacognitive training is taught at a higher cognitive level, in a andragogical format. Andragogy allows maximum learning of these higher cognitive skills (Rampp & Guffey, 1998).

A current trend for teaching higher order metacognitive skills is the use of infusion. Infusion is the teaching of thinking skills in the context of instructional subject matter. The typology for infusion is simple but effective. The teacher explains the metacognitive skill to be taught in the lesson, then it is modeled by the teacher, then

modeled by the learner. Then the learner reviews and evaluates their particular success with the metacognitive skill task at-hand. It is within this process of the explaining the skill workings, then the modeling of the skill by both trainer and learner, and the self-assessment that facilitates the learner to evolve a critical thinking ability. All of this within the context of classroom instructional content (Wilen & Phillips, 1995).

Composite Theory of Intellectual Acquisition

Extensive examination of the literature revealed a large hole in the available theories explaining metacognition. The use of stand-alone training has faults. It is organizationally awkward, requiring a separate set of instructors, materials, and classrooms. The infusion method also has shortcomings. In order to maximize the effectiveness of the infusion method the learner must already be a maturing learner. In other words, learners in the primary and middle school grades have been seen to have difficulty linking the content to the metacognitive techniques. What is needed is a more comprehensive approach to teaching metacognition. The authors suggest a new theory for consideration in the teaching of metacognition skills. The time has come to consider a new paradigm to better implement the techniques of effective metacognition training in our schools. We proposed what we have entitled the Composite Theory of Intellectual Acquisition. This new paradigm could effectively attend to the flaws or shortcomings of either the stand-alone model or the infusion model.

The study of metacognition for improving an individual's ability to think more clearly and remember more concisely has reached an impasse. It has expanded and been explored; each of it's sub-constructs has been researched, explored, and implemented as

stand alone techniques. What this essay is suggesting is that an implementation of multiple metacognitive techniques, simultaneously applied is the next step in the evolution in the field of metacognition training. A joining of stand-alone methods and infusion methods is at the heart of the theoretical model we are suggesting.

Historically, the research related to metacognitive techniques focused on a distinct function– learning how to learn. The next phase was the development of the many bi-polar conceptual statements that a great many researchers have stated with vigor and authenticity. These bi-polar conceptual statements mark our progression to date in study of metacognition techniques. These bi-polar statements are as follows:

voluntary training ----------directed training

separate----------inferred

direct instruction----------facilitation

skills----------techniques

instructor specialist----------teacher oriented

group----------individual

learning style inventory----------study techniques

While many of these bi-polar attitudes are self-explaining, a couple could use a larger explanation. The bi-polar term "separate–inferred" as used here means that the concepts of metacognition should be taught as a separate subject, as opposed to more indirect training where the content of the metacognitive process is more infused in the content of a given course. The bi-polar terms "learning style inventory–study techniques" need further explanation. In this bi-polar statement learning style inventory is used as a separate

approach to teaching metacognition. Where the study techniques are specific and discrete, such as note-taking, underlining, reciprocal teaching, and the like (Zhang, & RiCharde, 1997). There is a school of thought in the literature espousing that the appreciation of learning styles is a separate construct of metacognition (Everson, 1997; Tama, 1986).

Until these bipolar conceptual statements are no longer considered to completely explain metacognitive training, advancing the study of metacognition will remain difficult at best. These bi-polar approaches interfere in the development of the best way to teach and in the identification of which context is better for the acquisition of metacognitive skills.

There are at least three barriers to acceptance of metacognition training as the best method for teaching about learning how to learn. These barriers are,

Intellectual Barriers. One of the greatest barriers to learning has been the inability of the student to put his/her knowledge to work problem solving (Redding, 1990). Self-regulation is one of the more important components of metacognition involving an interaction of cognitive, metacognitive, and affective learning elements (Gourgey, 1998). The specific methods in examining how this cognitive interaction occurs needs to be further explored by researchers before this intellectual barrier can be removed.

Administrative Barriers. The literature is replete with various separate programs offering either a stand-alone method or infusive methods as the "best" way to teach these learning techniques. With the metacognitive techniques infused into the content in some schools and taught as stand-alone classes in other schools, neither approach has gained widespread in public schools. There needs to be developed a more comprehensive

approach to teaching metacognition techniques in our schools. Something more than "natural diffusion" needs to be used to accelerate the spread of this more efficient model for teaching metacognition.

To spur administrators on, a more effective strategy needs to be implemented in our schools. This paper only addresses the first of two of the phases needed for full adoption of the Composite Theory of Intellectual Acquisition. This first phase is the creation of the innovation, the second phase is the diffusion of the theory, and third phase is adoption at the level of the public school.

Implementation Barriers. The main barrier to full implementation is found in our current curriculum of teacher preparation programs. Most programs do not offer cognition as the way to improve student learning. Behaviorism is the preferred method even with it's well known limits. Behaviorism teaches classroom management, stimulus response methods of learning, and has limited usefulness above the 8th grade (Weinstein, 1988).

The use of a knowledge-production-utilization (KPU) model may be the most appropriate mechanism to diffuse the Composite Theory of Intellectual Development into the public schools. The first phase of the KPU model is the development phase which includes feasibility testing in "real-world" conditions. This development phase of diffusion of the theory means translating it into a practical model for use in the schools. The next phase of the KPU model is a dissemination phase to make the new theory readily available in attractive, easy-to-use formats at reasonable cost to the schools. This dissemination leads to an important three-part process, 1) a trial during which the new theory is tested in a limited way, 2) installation is the process of refinement and

adaptation to local conditions if the trial appears promising, and 3) institutalization where the new theory becomes an integral part of the school curriculum. This last part is important because this is where the new model continues to flourish after the external support is withdrawn (Owen, 1998).

Conclusion

This paper has suggested a new theory for the implementation of metacognition training. One that could move the study of helping kids to learn about metacognition as a useful set of learning tools. We have called this theory the Composite Theory of Intellectual Acquisition.

Composite theory of intellectual acquisition is simply putting together the two main schools of thought regarding how to best teach the child into one major approach. Metacognition is not a low level set of cute tricks to temporally improve learning. Metacognition is a long term method for long term improvement of mental capabilities related to intellectual development. Composite Theory could resolve the debate regarding the use of Metacognition training (stand-alone; infusion) in the schools.

Briefly, the Composite Theory is the melding of the two approaches; the stand alone approach and the infusion approach. The stand alone approach would be employed in the primary grades where concentration on mental skills development, through the assimilation and acquisition of basic metacognitive skills would be central. Once learners had been exposed to stand alone classes in metacognition skill development they would be ready for the higher skill development, critical thinking skills, in a infusion mode. With infusion, the metacognitive skills would be more content orientated. Through

discussion-based classroom instructional strategies, these junior high through senior high learners, would be infused with the critical thinking skills so necessary in today's world.

It is important to the understanding of the current study that the reader grasp the unfolding of the literature based research into the framework of this small analysis. The authors begin with an assumption that if a student has normal intellegence he ought to learn (Schacter, 1996). Why do so many students fail to do so? In some respects the answer came from the literature, but only a partial answer. The students today are more sophisticated, well informed, and technology savvy, but they have proven to be poor students (Guffey & Rampp, 1998; Guffey, Rampp, & Masters, 1998; Rampp & Guffey, 1998). Troubled by this conundrum, the authors sought an answer to "why can't Johnnie learn?"

We are suggesting a break from old paradigms to capture a vision of the possibilities of metacognition training in schools where the lower grades use stand alone classes to embrace the basic metacognition skills and the higher grades maximize the infusion of metacognitive training skills with the content based curriculum. The results may be a learner who uses the high level skills of critical thinking and is mature enough to grasp for himself the "teachable moment."

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